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REMARKS

Claims 1-6, 9-12, 14-17, and 19-25 are pending in this application. Claims 1, 3 and 14 are amended herein, new claims 21 to 25 are added and claim 18 is canceled herein. No new matter has been added. Applicant respectfully requests reconsideration of the claims in view of the following remarks.

Applicant appreciatively notes claims 3 and 4 would be allowable if rewritten in independent form to include all intervening limitations. Accordingly new claims 21 and 22 relate to original claims 3 and 4 respectively, and incorporate all intervening limitations.

The amendment to claim 1 finds support in part from claim 3 and also at page 4 line 25 to page 5 line 2 and Figure 1. The amendment to claim 14 finds support at page 5 line 4 to 20 and Figure 2. New claims 23-25 find support at page 6 lines 29 to 30.

Claims 1-2 and 7-9 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Kawamura, *et al.* (U.S. Patent No. 6,566,760, hereinafter "Kawamura"). Applicant respectfully traverses this rejection.

The Examiner considers Kawamura to disclose or teach all of the features of claims 1-2 and 7-9 of the present application. Applicant submits that each and every element as set forth in the claims 1-2 and 7-9 is not found, either expressly or inherently, in Kawamura. Thus, the cited reference does not anticipate the claimed invention.

The present invention as now defined in independent claim 1 relates to:

A semiconductor package comprising:
a substrate,
an integrated circuit mounted on the substrate,
a heat conductive plate having a first portion including a central region
interposed between the integrated circuit and the substrate, the central region
being heat-conductively connected to the integrated circuit and having at least one

second portion extending laterally out from the central region between the integrated circuit and the substrate; and

a second integrated circuit disposed between the central region and the substrate, the central region being in heat-conductive contact with the second integrated circuit, whereby heat generated by the second integrated circuit is conducted away from the second integrated circuit by the plate.

The Examiner asserts that the lead in Kawamura constitutes "a heat conductive plate... having at least one second portion extending laterally out from the central region between the integrated circuit and the substrate." The Examiner also refers to Figure 5. Applicant respectfully disagrees and traverses the Examiners assertion as follows.

Kawamura would not be effective at coupling heat from the integrated circuit. The leads are simply provided as electrical connections not as heat conductors. To clarify this claim 1 has been amend to require a central region. Clearly in Kawamura the leads do not have a central region. This teaches directly away from claim 1 which requires the heat conductive plate to have a central region.

Further the lead is not a plate. The lead in Figure 5, as described in columns 7-8, is interposed between the memory chip and the sealing resin. It is also not clear which portion of the lead would constitute the different portions as required in claim 1. Certainly in Figure 5 there is no second integrated circuit between the lead and the substrate. In summary, Kawamura does not disclose:

- a central region heat conductively connected to the first integrated circuit,
- a plate,
- a second portion extending laterally out from the central region, or
- a second integrated circuit between the plate and the substrate.

The required elements of currently amended claim 1 are not found in Kawamura.

Accordingly, Applicant submits that currently amended claim 1 is not anticipated by Kawamura.

Claim 10 has been rejected under 35 U.S.C. § 102(e) as being anticipated by Huang, *et al.* (US Patent Publication No. 2002/0074672, hereinafter "Huang"). Applicant respectfully traverses this rejection.

The Examiner considers Huang to disclose or teach all of the features of claim 10 of the present application. Applicant submits that each and every element as set forth in claim 10 is not found, either expressly or inherently, in Huang. Thus, the cited reference does not anticipate the claimed invention. The present invention as defined in independent claim 10 relates to:

A method of forming a plurality of semiconductor packages, the method comprising:

securing a heat-conductive plate over a substrate,
mounting a plurality of integrated circuits over the heat-conductive plate with a heat-conductive connection therebetween, the heat conductive plate having at least one portion extending laterally out from between the integrated circuit and the substrate, the plate extending between each of the integrated circuits and the substrate; and

cutting the substrate and the plate to produce a plurality of semiconductor packages each including at least one of the integrated circuits.

The Examiner asserts that the die pad layer 14 in Huang constitutes "a heat conductive plate...having at least one portion extending laterally out from between the integrated circuit and the substrate." The Examiner also refers to Figures 5G-5H. Applicant respectfully disagrees and traverses the Examiner's assertion as follows.

Clearly in Huang an individual relatively small die pad layer 14 (relative to the integrated circuit) is separately provided for each package. Accordingly the die pad layer 14 does not

- have a portion extending laterally out from between the integrated circuit and the substrate,

- extend between each of the integrated circuits and the substrate, or
- get cut during singulation.

The required elements of claim 10 are not found in Huang. Accordingly, Applicant submits that claim 10 is not anticipated by Huang.

Claims 14 and 18-20 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Shibata (US Patent Publication No. 2001/0035569, hereinafter "Shibata").

The Examiner considers Shibata to disclose or teach all of the features of claims 14 and 18-20 of the present application. Applicant submits that each and every element as set forth in the claims 14 and 18-20 is not found, either expressly or inherently, in Shibata. Thus, the cited reference does not anticipate the claimed invention.

The present invention as defined in independent claim 14 relates to:

A packaged semiconductor device comprising:
a substrate including a plurality of contact regions on an upper surface;
a heat conductive plate mounted over the substrate, the heat conductive plate comprising a central portion and a plurality of arms extending outwardly from the central portion, one or more of the arms extending laterally outwardly from a side surface of the central portion of the plate;
an integrated circuit having a bottom surface mounted over the central portion of the heat conductive plate; and
a plurality of wire bonds between an upper surface of the integrated circuit and the contact regions of the substrate, the wire bonds extending between adjacent ones of the arms of the heat conductive plate.

The support bars 1g in Shibata are diagonal and clearly do not extend laterally outwardly from a side surface of a central portion.

Further, Shibata does not disclose the additional limitations of original claim 18, elements of which are incorporated into currently amended claim 14. In relation to previously presented claim 18, the Examiner asserts that the wire bonds 4 are electrical connections extending

between adjacent support bars 1g. In relation to newly amended claim 14 Applicant respectfully disagrees and traverses the Examiner's assertion as follows.

The wire bonds 4 do not extend between the support bars 1g. Instead the wire bonds terminate on the leads 2 or wire bonding portion 1b. At no point are the wire bonds 4 "between" the support bars 1g.

The required elements of currently amended claim 14 are not found in Shibata. Accordingly, Applicant submits that currently amended claim 14 is not anticipated by Shibata.

Claims not specifically mentioned above depend from one of claims 1, 10 or 14 and add further limitations. It is respectfully submitted that these dependent claims are allowable by reason of depending from an allowable claim as well as for adding new limitations.

For example, claim 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura in view of Oshawa, *et al.* (US Patent Publication No. 2002/0031862, hereinafter "Ohsawa"). More specifically, the Examiner has objected to dependent claim 6 as he considers these claims to be obvious in light of a combination of the teachings of Kawamura and Oshawa.

The comments above in relation to newly amended claim 1 are reiterated in relation to claim 6. Neither Oshawa nor Kawamura have an outer portion of a plate of increased thickness. The interconnection film 2 and outer lead 3 do not constitute portions of a plate within the definition of claim 6.

In any event, Oshawa does not provide any of the features previously indicated as lacking in Kawamura. The required elements of previously presented claim 6 are not found in Kawamura, Oshawa, or any valid combination thereof. Accordingly Applicant submits that previously presented claim 6 is non obvious over Kawamura in view of Oshawa.

Claim 5 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura in view of Joshi (US Patent No. 4,069,498, hereinafter "Joshi"). More specifically, the Examiner has objected to dependent claim 5 as he considers this claim to be obvious in light of a combination of the teachings of Kawamura and Joshi.

The comments above in relation to newly amended claim 1 are reiterated in relation to previously presented claim 5. Moreover, Joshi does not disclose a plate as defined in claim 5, with which to connect to.

Joshi does not provide any of the features previously indicated as lacking in Kawamura. The required elements of previously presented claim 5 are not found in Kawamura, Joshi or any valid combination thereof. Accordingly Applicant submits that previously presented claim 5 is non obvious over Kawamura in view of Joshi.

Claims 9 and 19 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura in view of Papageorge, *et al.* (US Patent No. 5,438,224, hereinafter "Papageorge"). More specifically, the Examiner has objected to dependent claims 9 and 19 as he considers these claims to be obvious in light of a combination of the teachings of Kawamura and Papageorge.

The comments above in relation to newly amended claim 14 are reiterated in relation to previously presented claim 19.

Papageorge does not provide any of the features previously indicated as lacking in Kawamura. The required elements of previously presented claim 19 are not found in Kawamura, Papageorge or any valid combination thereof. Accordingly, Applicant submits that previously presented claim 19 is non obvious over Kawamura in view of Papageorge.

Claim 11 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Kawamura. More specifically, the Examiner has objected to dependent claim 12 as he

considers this claim to be obvious in light of a combination of the teachings of Huang and Kawamura.

The comments above in relation to claim 10 are reiterated in relation to previously presented claim 11. Kawamura does not provide a plate as defined in claim 11 which extends between each of the circuits and the substrate, and which is cut during singulation.

Thus Kawamura does not provide any of the features previously indicated as lacking in Huang. The required elements of previously presented claim 11 are not found in Huang, Kawamura or any valid combination thereof. Accordingly Applicant submits that previously presented claim 12 is non obvious over Huang in view of Kawamura.

Claim 12 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Sano, *et al.* (US Patent No. 5,952,714, hereinafter "Sano"). More specifically, the Examiner has objected to dependent claim 12 as he considers this claim to be obvious in light of a combination of the teachings of Huang and Sano.

The comments above in relation to claim 10 are reiterated in relation to previously presented claim 12. Sano does not provide a plate as defined in claim 12 which extends between each of the circuits and the substrate, and which is cut during singulation.

Sano does not provide any of the features previously indicated as lacking in Huang. The required elements of previously presented claim 12 are not found in Huang, Sano or any valid combination thereof. Accordingly Applicant submits that previously presented claim 12 is non obvious over Huang in view of Sano.

Claims 15 to 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata in view of Araki, *et al.* (US patent 6,828,661 hereinafter "Araki"). More specifically, the

Examiner has objected to dependent claims 15 to 17 as he considers these claims to be obvious in light of a combination of the teachings of Shibata and Araki.

The comments above in relation to claim 14 are reiterated in relation to previously presented claims 15 to 17. The groove 13a referred to by the examiner is clearly not a surrounding rim as defined in any of claims 15 to 17.

Araki does not provide any of the features previously indicated as lacking in Shibata. The required elements of previously presented claims 15 to 17 are not found in Shibata, Araki or any valid combination thereof. Accordingly Applicant submits that previously presented claims 15 to 17 are non obvious over Shibata in view of Araki.

It is felt that a full and complete response has been made to the Final Office Action, and Applicant respectfully submits that the pending claims are allowable over the cited art and that subject application is now in condition for allowance.

The fact that Applicant may not have specifically traversed any particular assertion by the Office should not be construed as indicating Applicant's agreement therewith.

In view of the above, Applicant respectfully submits that the application is in condition for allowance and requests that the Examiner pass the case to issuance. If the Examiner should have any questions, Applicant requests that the Examiner please contact Applicant's attorney at the address below. In the event that the enclosed fees are insufficient, please charge any additional fees required to keep this application pending, or credit any overpayment, to Deposit Account No. 50-1065.

Respectfully submitted,



Ira S. Matsil
Attorney for Applicant
Reg. No. 35,272

2/27/07

Date

Slater & Matsil, L.L.P.
17950 Preston Rd., Suite 1000
Dallas, Texas 75252-5793
Tel. 972-732-1001